Even while reviewing this impressive evidence for the role of mitochondria in respiration, Edmund Cowdry himself was not convinced:

> Although this view, that mitochondria take part in protoplasmic respiration, has been well received by cytologists and serves as a useful and convenient working hypothesis, it is still only a theory and must be regarded as such. (Cowdry, 1924, p. 325)

Cowdry preferred Claudius Regaud's (1909) interpretation that mitochondria served to select substances out of the cytoplasm and, after bringing them inside, condensed and transformed them into different products.

In the end, Cowdry was quite pessimistic about the prospects of rapid progress in the study of mitochondria:

> it is quite obvious that the investigation of mitochondria will never achieve the usefulness which it deserves as an instrument for advance in biology and medicine until we know much more of their chemical constitution as the only accurate basis for interpretation of our findings. In other words, we must wait upon the slow development of direct, qualitative cellular chemistry. (Cowdry, 1924, p. 311)

Having made little more progress by the late 1930s, Cowdry, on the advice of Simon Flexner, Director of the Rockefeller Institute, abandoned the problem of mitochondria and moved to cancer research.

### *Ergastoplasm or Basophilia (1900–1930)*

Investigators in the nineteenth century advanced a number of ideas about the constituency of the area of cytoplasm that largely appeared empty under the light microscope. One concept that would play a prominent role in the development of cell biology was that of *ergastoplasm*. According to Haguenau (1958), it stemmed from the thesis research of Charles Garnier, a French cytologist in Nancy who explored the effects on cells of a number of stains, including safranin, gentian violet, and toluidine blue. He identified a fibrillar material or rod-like structure in gland cells. Because he thought this structure was associated with production of secretion granules, he called it *ergastoplasm*, that is, the plasma that elaborates or transforms something (Garnier, 1897; Garnier, 1900). Because the intensity of stain varied with the stage of secretion in gland cells, Garnier concluded that ergastoplasm was not a permanent structure but emerged during the resting phase after secretion. He also proposed a link between the ergastoplasm topographically and the nucleus,